

REMARKS

Upon entry of this Response, claims 1-9 are pending, of which claim 1 is independent. No new matter is added. Applicants respectfully submit that the pending claims define over the art of record.

Claim Rejections under 35 U.S.C. § 112

Claims 1-9 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Specifically, the Examiner asserts that it is not clear what constitutes “a non-contact type motor.”

Applicants respectfully submit that a non-contact type motor is also known as a brushless motor in the art. A brushless motor is a synchronous electric motor which has an electronically controlled commutation system, instead of a mechanical commutation system based on brushes. In such motors, current and torque, voltage and rpm, are linearly related. An example of a non-contact motor may be found in, for example, United States Patent No. 6,420,810 and United States Patent Application No. 2008/0116753.

Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the rejection of claims 1-9 under 35 U.S.C. § 112, second paragraph.

Claim Rejections under 35 U.S.C. § 103

Claims 1-3 and 8-9 are rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent Application Publication No. JP 11-062631 to Sano et al. (hereafter “Sano”) in view of U.S. Patent No. 5,522,416 to Farrell et al. (hereafter “Farrell”).

Claims 4-7 are rejected under 35 U.S.C. §103(a) as being unpatentable over the Sano reference, in view of the Farrell reference, and further in view of Canadian Patent No. 2,261,243 to Dell et al. (hereafter “Dell”).

Applicants respectfully submit that the Sano, Farrell and Dell references, alone or in combination, do not teach or suggest that *when the non-contact type motor is de-energized, the opening is fully open for discharging water from the fuel cells without consuming electric power*, as recited in amended claim 1. The Examiner asserts that this limitation is an intended use

limitation for the system. *See* Office Action, page 3. The Examiner indicates that the Sano reference teaches a regulator comprising a limiting member for limiting an angular position of the valve body, and all structural limitations of the regulator according to the present invention are obvious from the Sano reference.

Applicants respectfully submit that the limitation *when the non-contact type motor is de-energized, the opening is fully open for discharging water from the fuel cells without consuming electric power* of claim 1 is a structural limitation of the regulator of the present invention. Applicants believe that the limitation should be given patentable weight.

Claim 1 clearly defines a limiting member for limiting an angular position of the valve body, to keep said opening fully open. Applicants respectfully submit that in the present invention when the operation of the valve body is stopped, the valve body is positioned so that the opening is fully opened by the limiting member as a structural component. Claim 1 also defines this important feature of the pressure regulator of the present invention. In light of these reasons, Applicants respectfully submit that the limitation *when the non-contact type motor is de-energized, the opening is fully open for discharging water from the fuel cells without consuming electric power* is not an intended use but a structural limitation.

Furthermore, the Sano reference does not teach or suggest *a regulator comprising a limiting member*, as recited in claim 1. The Sano reference merely teaches that the throttle shaft (2) is urged by the return spring (9) to make the valve (4) fully open for preventing backlash in the reduction gear mechanism (6). *See* paragraph [0020]. The structure of the Sano reference does not require a stopper or the like for limiting the rotor position, particularly to the reference position thereof. *See* [0010]. As is clear from this description, the regulator disclosed in the Sano reference does not have any stopper or limiting member. The Sano reference fails to teach or suggest *a regulator comprising a limiting member*, as recited in claim 1.

As clearly illustrated in Figure 1 of the Sano reference, the regulator comprises a stepping motor, a shaft and a gear interposed between the stepping motor and the shaft. The degree of rotation of the gear and the shaft is controlled by the degree of rotation of the rotational shaft of the stepping motor. Furthermore, the degree of rotation of the shaft controls the opening of the valve attached to the shaft. *See* [0026] and [0027].

Moreover, the Sano reference describes the operation at the time the stepping motor is de-energized. *See* [0020]. Although the throttle shaft is returned by the return spring 9, the torque of the return spring is set to a range that is larger than the rotational friction torque of the throttle shaft and smaller than the detent torque of the stepping motor. Therefore, the valve is stopped at an arbitrary position between the full close to the full open when the stepping motor is turned off. Accordingly, the regulator of the Sano reference does not include a limiting member.

In contrast, in the present invention, the pressure regulator comprises a limiting member for reliably stopping the valve body at a full open state. Since the limiting member stops the valve body at the position where the opening is fully opened when the motor is de-energized, the opening is prevented from being closed by the valve body passing through the full open position.

In the present invention, because the limiting member limits the angular position of the valve body to keep the opening fully open when the motor is de-energized, water can be prevented from being retained inside the fuel cell stack without consuming electric power at the time the power generation of the fuel cell is stopped. As a result, the fuel cell system employing the pressure regulator according to the present invention can be operated efficiently and economically without wasting electric power.

The Sano reference does not intend to keep the opening fully open when the motor is de-energized and does not have a limiting member. *See* [0020] and [0010]. The Sano reference does not necessarily stop the valve at the full open position. Therefore, it is not possible for the Sano reference to achieve the above-mentioned advantages of the present invention.

Applicants provide attached English translations of paragraphs [0010], [0020], [0026] and [0027] of the Sano reference to present the Examiner with the accurate contents of the Sano reference. In light of the above arguments and the attached English translation of the Sano reference, Applicants respectfully submit that the Sano reference does not teach or suggest each and every element of claim 1.

The Farrell reference and the Dell reference fail at curing the shortcomings of the Sano reference with respect to the limitation *when the non-contact type motor is de-energized, the opening is fully open for discharging water from the fuel cells without consuming electric power.*

Specifically, the Farrell reference, the Dell reference and the Sano reference, alone or in any reasonable combination, do not teach or the limitation *when the non-contact type motor is de-energized, the opening is fully open for discharging water from the fuel cells without consuming electric power*, as recited in claim 1.

Claims 2-9 depend from claim 1 and, as such, incorporate each and every element of claim 1. In light of the arguments presented above, Applicants respectfully submit that claims 1-9 define over the Sano, Farrell and Dell references. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the rejection of claims 1-9 under 35 U.S.C. §103(a).

CONCLUSION

In view of the above remarks, applicants believe the pending application is in condition for allowance.

Please charge any shortage or credit any overpayment of fees to our Deposit Account No. 12-0080, under Order No. TOWK-015RCE. In the event that a petition for an extension of time is required to be submitted herewith, and the requisite petition does not accompany this response, the undersigned hereby petitions under 37 C.F.R. § 1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized to be charged to the aforementioned Deposit Account.

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Respectfully submitted,

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